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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/519,713

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EXAMINER

MALDONADO, JULIO J

ART UNIT

PAPER NUMBER

2823

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/519,713	<b>Applicant(s)</b> MATSUURA ET AL.	
	<b>Examiner</b> Julio J. Maldonado	<b>Art Unit</b> 2823	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 17 September 2007.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-34 is/are pending in the application.
- 4a) Of the above claim(s) 1 and 13-18 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 34 is/are allowed.
- 6) ☒ Claim(s) 2-10, 12 and 19-33 is/are rejected.
- 7) ☒ Claim(s) 11 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>10/05/2007</u> . | 6) <input type="checkbox"/> Other: _____  |

**DETAILED ACTION**

1. The rejection of claims 2-10, 12 and 19-31 as set forth in the office action mailed on 05/15/2007 is withdrawn in view of the applicants' arguments filed on 09/17/2007.
2. The addition of claims 32-34 is acknowledged.
3. Claims 2-12 and 19-31 are pending in the application.
4. Claims 1 and 13-18 were previously withdrawn from consideration.

***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 2-10, 12 and 19-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fjelstad (6,856,235 B2) in view of Lin et al. (U.S. 5,273,938, hereinafter Lin), Fukumoto et al. (U.S. 6,879,026 B2, hereinafter Fukumoto) and Oka et al. (U.S. 6,132,865, hereinafter Oka).

In reference to claims 2, 3, 6, 19, 20, 23-27 and 29-31, Fjelstad (Figs.1A-1G) teaches a method of forming a semiconductor package including providing a sacrificial layer (100) made of a conductive metallic material, a polymer material or a combination of both a conductive metallic material and a polymer material; forming wiring circuit (111, 112) on selected areas of the sacrificial layer (100), wherein said wiring circuit (111, 112) includes a doe pad (112) and an inner lead (111); electrically connecting a semiconductor die (135) onto the surface of the wiring circuit (111, 112); molding the

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semiconductor die and the exposed surface of the wiring circuit (111, 112) with a molding compound (140); removing the sacrificial layer (100) from the wiring circuit (111, 112) and the molding compound (140); and dividing the molded wiring circuit to give a plurality of semiconductor devices each having one semiconductor die (Fjelstad, column 4, line 38 - column 6, line 14).

Fjelstad fails to disclose laminating to one side of a metal sheet an adhesive film and processing metal sheet to give a wiring circuit.

However, Lin (Figs.1-2) teaches a method of forming semiconductor packages including providing a sheet film (12) made of a flexible material such as a polyimide or polyester material; laminating directly on sheet film (12) a metal layer; and processing said metal layer to give a wiring circuit (13) (Lin, column 2, line 64 – column 3, line 24).

It would have been within the scope of one of ordinary skill in the art to combine the teachings of Fjelstad and Lin to enable forming the wiring circuit of Fjelstad according to the teachings of Lin because one of ordinary skill in the art would have been motivated to look to analogous art teaching alternative suitable or useful methods of forming the disclosed wiring circuit and art recognized suitability for an intended purpose has been recognized to be motivation to combine. MPEP 2144.07.

The combined teachings of Fjelstad and Lin fail to disclose wherein the sacrificial layer includes an adhesive layer.

However, Fukumoto teaches a method of processing semiconductor devices including the steps of adhering a substrate to a sacrificial material, said sacrificial material including an adhesive layer and a support layer (Fukumoto, column 5, lines 36

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- 52), wherein said adhesive layer is made of a resin manufactured by graft-copolymerizing unsaturated nitrile, alkyl (meth)acrylate, and monomer compounds, wherein said adhesive can also contain unsaturated carboxylic acid esters such as alkyl acrylate which comprises alkyl group with one to four carbons or alkyl methacrylate, preferably methyl (meth)acrylate and ethyl (meth)acrylate (Fukumoto, column 9, lines 19- 56), and wherein the elastic modulus of said adhesive layer is of 100 MPa to 1,000 Mpa (Fukumoto, column 6, lines 44 - 52); and peeling off the sacrificial layer after processing the substrate (Fukumoto, column 5, lines 19 - 35).

It would have been within the scope of one of ordinary skill in the art to combine the teachings of Fjelstad and Lin with Fukumoto to enable the formation of the sacrificial layer of Fjelstad and Lin according to the teachings of Fukumoto because one of ordinary skill in the art at the time the invention was made would have been motivated to look to alternative suitable sacrificial layers in Fjelstad and Lin and art recognized suitability for an intended purpose has been recognized to be motivation to combine. MPEP 2144.07.

The combined teachings of Fjelstad, Lin and Fukumoto fail to disclose wherein the adhesive film comprises a support film and a resin layer A formed on one side or both sides of the support film, the 90 degree peel strength between the resin layer A and the metal sheet prior to the processing of the metal sheet laminated with the adhesive film for semiconductor use to give the wiring circuit being 20 N/m or greater at 25°C, and the 90 degree peel strengths, after molding with a molding compound the wiring circuit laminated with the adhesive film for semiconductor use, between the resin

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layer A and the wiring circuit and between the resin layer A and the molding compound both being 1000 N/m or less at least one point in the temperature range of 0°C to 250°C.

However Oka teaches a method of forming adhering a tape to a semiconductor package, wherein the tape comprises an adhesive layer made of a resin, labeled resin layer A, is made of an aromatic polyimide (Oka, column 6, lines 28 - 49) formed on a support layer comprising an aromatic polyimide (Oka, column 6, line 50 - column 7, line 5), wherein the glass transition temperature is controlled by controlling the materials used to make the tape (Oka, column 6, lines 38 - 49). Furthermore, Oka discloses that the glass transition temperature affects the adhesiveness of the package (Oka, column 2, lines 31 - 48).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Fjelstad, Lin and Fukumoto with Oka to enable using an tape in the combination of Fjelstad, Lin and Fukumoto according to the teachings of Oka because this would result in a sacrificial layer capable of adhering at a relatively low temperature, without generating gas and causing interfacial separation, with keeping electrical insulating and having sufficient reliability (Oka, column 2, line 64 - column 3, line 3).

The combined teachings of Fjelstad, Lin, Fukumoto and Oka fail to expressly disclose wherein the adhesive film comprises a support film and a resin layer A formed on one side or both sides of the support film, the 90 degree peel strength between the

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resin layer A and the metal sheet prior to the processing of the metal sheet laminated with the adhesive film for semiconductor use to give the wiring circuit being 20 N/m or greater at 25°C, and the 90 degree peel strengths, after molding with a molding compound the wiring circuit laminated with the adhesive film for semiconductor use, between the resin layer A and the wiring circuit and between the resin layer A and the molding compound both being 1000 N/m or less at least one point in the temperature range of 0°C to 250°C.

However, the selection of the claimed properties is obvious because it is a matter of determining optimum process condition by routine experimentation with a limited number of species to obtain a desired tape with desired adhesiveness. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to enable using the combination of Fjelstad, Lin, Fukumoto and Oka to arrive at the claimed invention through routinary experimentation.

In reference to claim 4, the combined teachings of Fjelstad, Lin, Fukumoto and Oka teach wherein the glass transition temperature is controlled by controlling the materials used to make the tape (Oka, column 6, lines 38 - 49) and wherein the glass transition temperature affects the adhesiveness of the package (Oka, column 2, lines 31 - 48), but fails to disclose wherein the resin layer has a glass transition temperature of 100°C to 300°C.

However, the selection of the claimed glass transition temperature range is obvious because it is a matter of determining optimum process condition by routine experimentation with a limited number of species to obtain a desired tape with desired

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adhesiveness. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to enable using the combination of Fjelstad, Lin, Fukumoto and Oka to arrive at the claimed invention through routinary experimentation.

In reference to claims 5, 7-9, 32 and 33, the combined teachings of Fjelstad, Lin, Fukumoto and Oka teach wherein the resin layer A is a polyimide containing ether groups, labeled polyetherimide (column 3, lines 7 – 53), but fail to disclose wherein the temperature at which the resin layer A shows a 5 wt% loss is 300°C or greater.

However, the recited weight loss would flow naturally from the value of adhesiveness arrived at through routine optimization. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to enable using the combination of Fjelstad, Lin, Fukumoto and Oka to arrive at the claimed limitation.

In reference to claims 10 and 12, the combined teachings of Fjelstad, Lin, Fukumoto and Oka teach wherein the sacrificial layer has a thickness of about 100-200 $\mu$ m, but said sacrificial layer could be thicker or thinner (Fjelstad, column 4, lines 38 - 52).

The combination of Fjelstad, Lin, Fukumoto and Oka fail to expressly disclose wherein the ration (A/B) of the thickness (A) of the adhesive layer to the thickness (B) of the support film is 0.5 or less and wherein the thickness of the adhesive layer is 200 $\mu$ m or less.

One of ordinary skill in the art would have been led to the recited dimensions through routine experimentation and optimization to obtain a desired sacrificial layer.

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Applicant has not disclosed that the dimensions are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical, and it appears prima facie that the process would possess utility using another dimension. Indeed, it has been held that mere dimensional limitations are prima facie obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical. See, for example, *In re Rose*, 220 F.2d 459, 105 USPQ 237 (CCPA 1955); *In re Rinehart*, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976); *Gardner v. TEC Systems, Inc.*, 725 F.2d 1338, 220 USPQ 777 (Fed. Cir.1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984); *In re Dailey*, 357 F.2d 669, 149 USPQ 47 (CCPA 1966). See also MPEP 2144.04(IV)(B).

In reference to claim 21, the combined teachings of Fjelstad, Lin, Fukumoto and Oka teach wherein the step of electrically connecting the semiconductor die onto an exposed surface of the wiring circuit includes bonding the semiconductor die to the die pad and wire bonding the semiconductor die and the inner lead with wires (Fjelstad, Fig.1D-1 and column 5, lines 32 – 41).

In reference to claim 22, the combined teachings of Fjelstad, Lin, Fukumoto and Oka substantially teach all aspects of the invention but fail to expressly disclose wherein the step of peeling off the adhesive film is performed at a temperature in a range of 0°C to 250°C.

However, the selection of the claimed temperature range is obvious because it is a matter of determining optimum process condition by routine experimentation with a limited number of species. Where the general conditions of a claim are disclosed in the

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prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to enable using the combination of Fjelstad, Lin, Fukumoto and Oka to arrive at the claimed invention through routinary experimentation.

In reference to claim 28, the combined teachings of Fjelstad, Lin, Fukumoto and Oka substantially teach all aspects of the invention but fail to disclose heating prior to the molding step so as to increase adhesive strength between the resin layer A and the wiring circuit. However, the prior art of record teach controlling the glass transition temperature by controlling the materials used to make the tape (Oka, column 6, lines 38 - 49), wherein the glass transition temperature affects the adhesiveness of the package (Oka, column 2, lines 31 - 48).

Furthermore, the submitted evidence to Nishinaka et al. (U.S. 6,586,081 B1) teach wherein the adhesives have peel strengths that increase with increasing temperature (Nishinaka, column 4, line 43 – column 6, line 47 and column 22, Table 14).

Since the prior art of record requires using sacrificial layers with high adhesiveness for the purpose of securing the semiconductor package, and furthermore, since the prior art of record teaches that the peel strength of the adhesive layer increases with temperature, one of ordinary skill in the art at the time the invention was made would have been led to the recited limitation through routinary experimentation.

***Allowable Subject Matter***

7. Claim 11 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.
8. Claim 34 is allowed.
9. The following is a statement of reasons for the indication of allowable subject matter: the prior art of record fails to disclose wherein the resin layer A, is formed on one side of the support film, and a resin layer B having no adhesion and an elastic modulus at 230° of 10 MPa or greater is formed on the opposite side thereof as disclosed in claims 11 and 34.

***Response to Arguments***

10. Applicant's arguments filed 09/17/2007 have been fully considered but they are not persuasive.

Applicants argue, "...It is respectfully submitted that Fjelstad would have neither disclosed nor would have suggested the presently claimed subject matter, including use of the adhesive film having the various 90 degree peel strengths, and advantages thereof...".

In response to this argument, the applicants assert that Fjelstad fails to disclose the claimed peel strengths. However, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

In this case, the combination of Fjelstad, Lin, Fukumoto and Oka fail to disclose the claimed peel strengths. However, the combination of Fjelstad, Lin, Fukumoto and Oka teach wherein controlling the materials controls the glass transition temperature used to make the tape (Oka, column 6, lines 38 - 49) and wherein the glass transition temperature affects the adhesiveness of the package (Oka, column 2, lines 31 - 48). Furthermore, the submitted evidence to Nishinaka et al. (U.S. 6,586,081 B1) teach wherein the adhesives have peel strengths that increase with increasing temperature (Nishinaka, column 4, line 43 – column 6, line 47 and column 22, Table 14). Therefore, the claimed peel strengths values would naturally flow from the value of adhesiveness arrived at through routinary optimization.

### ***Conclusion***

11. Applicants are encouraged, where appropriate, to check Patent Application Information Retrieval (PAIR) (<http://portal.uspto.gov/external/portal/pair>) which provides applicants direct secure access to their own patent application status information, as well as to general patent information publicly available.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to examiner Julio J. Maldonado whose telephone number is (571) 272-1864. The examiner can normally be reached on Monday through Friday.

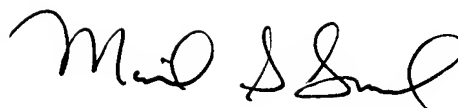
13. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Smith, can be reached on (571) 272-1907. The fax number for this group is 571-273-8300. Updates can be found at <http://www.uspto.gov/web/info/2800.htm>.

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Julio J. Maldonado  
November 24, 2007

Julio J. Maldonado  
Patent Examiner  
Art Unit 2823



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